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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/505,695	02/17/2000	Ivan Berry	0932/00381	6935

7590 05/17/2002

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EXAMINER

LE, THAO X

ART UNIT	PAPER NUMBER
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2814

DATE MAILED: 05/17/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/505,695

Applicant(s)

BERRY ET AL. *Me*

Examiner

Thao X Le

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 January 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-19 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 103*

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 6,242,165 to Vaartstra, and further in view of US Patent 5,578,133 to Sugino et al.

Regarding to claim 1, 4, Vaartstra teaches the method of enabling the removal of fluorine containing residue, column 6 line 49, from a semiconductor substrate 12, fig. 1, comprising the steps of: applying a gas and /or vapor to which the residue is reactive to the residue while the temperature of the substrate is at an elevated level, column 7 line 55-56, with respect to ambient temperature for a time period, column 8 line 50, which is sufficient to effect at least one of volatilizing the residue, column 5 line 7-9.

Vaartstra does not expressly teach the residue is exposed to the ultraviolet radiation. However, Sugino's reference discloses the exposing the ultraviolet radiation. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of Sugino with Vaartstra, because it would have assisted the activation of halogen (fluorine) molecules, column 1 line 45-46.

Regarding to claim 2, 3, 6, 9, 10, 11, 14, 16, 17, 18, 19, Vaartstra discloses the method wherein the gas is comprised of ammonia is mixed with nitrogen, column 5 line 54-58, and the gas is applied at a pressure at about one atmosphere, column 8 line 5.

Regarding to claim 5, Vaartstra teaches the method wherein before the gas is applied, an ashing process is performed on the photoresist, column 6 line 65.

Regarding to claim 7, 8, 13, and 15, Vaartstra does not expressly teach the substrate is rinsed with deionized (DI) water. However, the substrate is rinsed with DI water after dry etching is well know in the art, see Silicon Processing for the VLSI Era Volume 1 by S. Wolf and R.N. Tauber, page 514-517

Regarding to claim 12, Vaartstra discloses a method of processing in Fig. 1 a semiconductor wafer comprising the steps of: coating the wafer with photoresist 16, imaging a pattern on the photoresist, column 6 line 64, forming integrated circuit component on the wafer, column 7 line 10, and removing the photoresist from the wafer by

a) performing an ashing process on the photoresist which removes the photoresist except for a residue, column 6 line 63-67, and

b) removing the residue by applying an ammonia gas to the residue while the temperature of the substrate is at an elevated level, column 7 line 55-56, with respect to ambient temperature for a time period, column 8 line 50, which is sufficient to effect at least one of volatilizing the residue, column 5 line 7-9.

Vaartstra does not expressly teach imaging a pattern on the photoresist with ultraviolet radiation, developing the photoresist, hardbaking or stabilizing the photoresist, and the residue is exposed to the ultraviolet radiation. However, imaging a pattern on the photoresist with ultraviolet radiation, developing the photoresist, and hardbaking or stabilizing the photoresist are well known processes in the art and they are being published

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in the Silicon Processing for the VLSI Era Volume 1 by S. Wolf and R.N. Tauber, Chapter 12, see page 429 Fig. 14, pages 434, and 452-453

However, Sagino's reference discloses the exposing the ultraviolet radiation. At the time of the invention was made; it would have been obvious to one of ordinary skill in the art to combine the teaching of Sagino with Vaartstra, because it would have assisted the activation of halogen (fluorine) molecules, column 1 line 45-46.

### *Conclusion*

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a) US Patent 5,677,113 to Suzuki et al.

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thao X Le whose telephone number is 703-306-0208. The examiner can normally be reached on M-F from 8:00 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

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Thao X. Le  
May 13, 2002



**PHAT X. CAO**  
**PRIMARY EXAMINER**